REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1-7 are currently pending in this application. No claims have been amended. Accordingly, no new matter has been added.

In view of the remarks herein, Applicants respectfully request that the Examiner withdraw all outstanding rejections and allow the currently pending claims.

Issues Under 35 U.S.C. § 103(a)

Claims 1-7 stand rejected under 35 U.S.C. §103(a) as being obvious over Hosokawa (EP 0 889 063) (hereinafter EP '063) in view of Shimomura et al. (U.S. 4,959,060) (hereinafter Shimomura '060). Applicants respectfully traverse.

The Examiner asserts that EP '063 discloses synthesis of a super absorbent resin composition comprising components (A), (B) and (C), or components (A) and (D); (A) a super absorbent resin; (B) a metal compound containing at least one metal A selected from the group consisting of titanium and zirconium; (C) a chelating agent, and (D) a coordination compound in which component (C) is coordinated with metal (A). The Examiner further asserts that EP '063 discloses that, if desired, the super absorbent resin composition can contain various additives, such as reducing agents, which can be added in a total amount of not more than 50% by weight based on the total weight of the super absorbent resin composition.

The Examiner acknowledges that EP '063 does not disclose adding a reducing or an oxidizing agent to the polymerized water-containing gelated product in an amount of 0.001 to 6

parts by weight based on 100 parts by weight of the α,ß-unsaturated carboxylic acid, and relies on the teachings of Shimomura '060 to overcome the deficiencies of EP '063.

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, there must be a reason why one of ordinary skill in the art would modify the reference or combine reference teachings to obtain the invention. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). There must be a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* The Supreme Court of the United States has recently held that the "teaching, suggestion, motivation test" is a valid test for obviousness, albeit one which cannot be too rigidly applied. *Id.* Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *Id.*

As evidenced by the enclosed Declaration Under 37 C.F.R. 1.132, the method of adding a reducing or oxidizing agent to a water-absorbent resin after drying, according to the teachings of EP '063 and Shimomura '060, does not achieve the superior and unexpected results achieved by the presently claimed method. In particular, the method at which one skilled in the art would arrive based on the teachings of the cited prior art references does not result in prevention of coloration at a level remotely similar to that achieved by the present method of adding a reducing

or oxidizing agent **to a water-containing gelated product after polymerization** (emphasis added).

A comparative experiment was conducted by carrying out the same procedures as in Example 3 of the present invention, except that the step of adding 3.52 g of a 3% by weight aqueous sodium sulfite solution to a water-containing gelated product dispersed in n-heptane after the polymerization (presently claimed method) was changed to a step of adding 3.52 g of a 3% by weight aqueous sodium sulfite solution to a water-absorbent resin obtained by distilling off water and n-heptane to dryness (i.e. after drying), while mixing (method of EP '063 and Shimomura '060).

Example 3 of the present invention shows that, when a reducing agent is added to a water-containing gelated product after polymerization, the yellow index after the production is 7.4, and the yellow index after the test (i.e., after allowing to stand at 50°C and 90% relative humidity for 20 days) is 8.2. In stark contrast, the comparative experiment discussed in the attached Declaration shows that, when a reducing agent is added to a water-absorbent resin after drying, the yellow index after the production is 11.9, and the yellow index after the test is 14.2. Therefore, it is evident that the method of EP '063 and Shimomura '060 does not achieve the results achieved by the present method, as the yellow index after the production is high, the yellow index after the test is high, and the coloration resistance is substantially inferior. This evidence shows that the present method of adding a reducing agent or an oxidizing agent to a water-containing gelated product after production is superior and not obvious over the cited prior art.

At page 6 of the outstanding Office Action, while discussing the yellow index of the product of the prior art, the Examiner asserts that "in view of substantially identical process and ingredients for preparing a water-absorbent resin composition between Nosokawa (sic) and Shimomura, and instant claims, it is the examiner's position that the final product of Nosokawa (sic) and Shimomura's process…possesses these properties". Applicants strongly disagree.

Applicants have conducted follow-up experiments of the cited references to verify the yellow index of the final products obtained by the methods disclosed therein. The results of these experiments are discussed in the attached Declaration.

For purposes of experimentation, Example 1 of EP '063, which uses sodium tripolyphosphate as a metal chelating agent, was reproduced. Additionally, Shimomura's Example 1, which uses sodium thiosulfate as a reducing agent, and Example 5, which uses a combination of a reducing agent (sodium thiosulfate) and an oxidizing agent (hydrogen peroxide) were reproduced.

As shown in the attached Declaration, the superabsorbent resin composition of Example 1 of EP '063 has a yellow index after production of 12.0, and a yellow index after the test of 21.2. The absorbent composition of Example 1 of Shimomura '060 has a yellow index after production of 10.9, and a yellow index after the test of 39.5. Furthermore, the absorbent composition of Example 5 of Shimomura '060 has a yellow index after production of 11.5, and a yellow index after the test of 64.1. Therefore, as compared to the water-absorbent resin of Example 3 of the present invention, it is evident that the yellow index after production of the products of the prior art are extremely high, with the yellow index after the test being even higher (and certainly exceeding 12), so that the coloration resistance is worsened. Clearly, these

results are evidence that the water-absorbent resin obtained by the method of the present invention exhibits a superior coloration resistance as compared to those of EP '063 and Shimomura '060.

Applicants respectfully submit that, in any given production step in the method of producing a water-absorbent resin according to the present invention, an advantageous effect is obtained, as coloration is prevented by adding a metal chelating agent and a reducing or oxidizing agent to a water-containing gelated product after polymerization. This effect is neither achieved nor suggested by the teachings of EP '063 and Shimomura '060. Evidently, one skilled in the art would not have arrived at the present method based on the disclosure of the cited references.

Because the invention, as set forth in Applicants' claims, is not disclosed or made obvious by the cited prior art, reconsideration and withdrawal of this rejection are respectfully requested.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and objections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Gerald M. Murphy, Jr., Reg. No. 28,977 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Dated: FEB 4 2008

Respectfully submitted,

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Attachment: Declaration Under 37 C.F.R. 1.132

Docket No.: 1422-0635PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:	
Masayoshi HANDA et al.	
Application No.: 10/501,507	Confirmation No.: 008270
Filed: July 15, 2004	Art Unit: 1713
For: PROCESS FOR PRODUCING WATER-ABSORBING RESIN	EXAMINER: BERNSHTEYN, Michael

DECLARATION UNDER 37 C.F.R. 1.132

COMMISSIONER FOR PATENTS
P. O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Masayoshi HANDA, residing in Hyogo-ken, Japan, hereby declare and state as follows:

1. I am one of the co-inventors of U.S. Application Serial No. 10/501,507 filed on July 15, 2004, entitled PROCESS FOR PRODUCING WATER-ABSORBING RESIN. I am thoroughly familiar with the contents of said Application, its prosecution before the United States Patent and Trademark Office and the references cited therein.

2. I received a master's degree from Kanazawa University of Japan, faculty of natural science and technology in the year 1994, majoring in material chemistry.

3. I have been employed in Sumitomo Seika Chemicals Co., Ltd. in the year 1994 and have been assigned to the Research Laboratories.

4. I have been involved in the research and development of water-absorbent resin since 1998.

5. The following experiments were conducted by myself or under my direct supervision and control in order to verify that the water-absorbent resin obtained in the present invention is distinguishable from the combined references of EP0889063 A1 (hereinafter simply referred to as "EP'063") and Shimomura et al. (U.S. Patent No. 4,959,060, hereinafter simply referred to as "Shimomura").

EXPERIMENTAL METHOD

Comparative Experiment

The following comparative experiment was conducted.

In the comparative experiment, the same procedures as in Example 3 of the present specification were carried out except that a reducing agent was added to a water-absorbent resin after drying (non-gelated product).

Specifically, 500 ml of n-heptane was added to a 1000-ml five-necked cylindrical round bottomed flask equipped with a stirrer, a reflux condenser, a dropping funnel, a thermometer and a nitrogen gas inlet tube. Thereto was added 0.92 g of sucrose fatty acid ester (surfactant: S-370, manufactured by MITSUBISHI CHEMICAL CORPORATION) having an HLB of 3.0 and dispersed. The temperature of the dispersion was raised to dissolve the surfactant, and thereafter cooled to 55°C.

Separately from the above, 92 g of a 80% by weight aqueous solution of acrylic acid was added to a 500-ml Erlenmeyer flask. Thereto was added

dropwise 102.2 g of a 30% by weight aqueous sodium hydroxide solution while externally cooling, to neutralize 75% by mol of acrylic acid, to give a partially neutralized salt of acrylic acid. Further, 50.2 g of water, 0.11 g of a polymerization initiator potassium persulfate, and 9.2 mg of a crosslinking agent ethylene glycol diglycidyl ether were added thereto, to give an aqueous solution of a monomer for a first step polymerization.

The entire amount of this aqueous solution of the monomer for a first step polymerization was added to the above-mentioned five-necked cylindrical round bottomed flask under stirring and dispersed. After the internal of the system was sufficiently replaced with nitrogen, the temperature of the mixture was raised, and the polymerization reaction was carried out for 1 hour while keeping its bath temperature at 70°C. Thereafter, the polymerization slurry was cooled to room temperature.

Further, 119.1 g of a 80% by weight aqueous solution of acrylic acid was added to a separate 500-ml Erlenmeyer flask. Thereto was added dropwise 132.2 g of a 30% by weight aqueous sodium hydroxide solution while cooling, to neutralize 75% by mol of acrylic acid. Further, 27.4 g of water, 0.14 g of potassium persulfate, and 35.7 mg of ethylene glycol diglycidyl ether were added thereto, to give an aqueous solution of a monomer for a second step polymerization. The aqueous solution was cooled in an ice water bath.

The entire amount of this aqueous solution of the monomer for a second step polymerization was added to the above-mentioned polymerization slurry. After the internal of the system was again sufficiently replaced with nitrogen, the temperature of the mixture was raised, and the second-step polymerization reaction was carried out for 2 hours while keeping its bath temperature at 70°C.

After the termination of the polymerization, 0.264 g of a 40% by weight aqueous solution of pentasodium diethylenetriaminepentaacetate was added to a water-containing gelated product dispersed in n-heptane under stirring. Subsequently, water of the water-containing gelated product was removed to the external of the system by azeotropic dehydration. To the resulting gelated product was added 8.44 g of a 2% by weight aqueous solution of ethylene glycol diglycidyl ether, and water and n-heptane were further removed from the mixture by distillation, and the residue was dried, to give 215.5 g of a water-absorbent resin.

The entire amount of the water-absorbent resin obtained above was placed in a 1000-ml five-necked cylindrical round bottomed flask equipped with a stirrer, and 3.52 g of a 3% by weight aqueous sodium sulfite solution was added thereto while mixing, to give a water-absorbent resin for a comparative experiment.

The yellow index was measured according to the method described in the present specification for the water-absorbent resin of the comparative experiment obtained.

Follow-up Experiments of Cited References

I. Follow-up Experiment of EP'063

The follow-up experiment of EP'063 was carried out in the following manner.

The follow-up experiment of EP'063 was carried out in the same manner as in Example 1 of EP'063 as detailed below.

Specifically, first, a metal compound was prepared. To an ice-cooled solution of 10.9 g of sodium gluconate in 37.5 g of ion-exchanged water was added dropwise 5.0 g of titanium tetrachloride and mixed. After confirming that the solution turned clear, 11.9 g of a 30% aqueous sodium hydroxide solution was added dropwise thereto to adjust the solution to pH 7. The resulting solution was clear and faintly yellow.

Next, a superabsorbent resin and a superabsorbent resin composition were synthesized. In a 1000 ml five-necked cylindrical rounded bottom flask equipped with a stirrer, a reflux condenser, a dropping funnel, and a nitrogen gas inlet tube were charged 400 ml of cyclohexane and 0.625 g of ethyl cellulose (trade name: Ethyl Cellulose N-100, manufactured by Sigma-Aldrich) as a dispersant. Nitrogen gas was blown into the mixture to drive out dissolved oxygen and the contents of the flask were raised to 75°C.

In a separate flask, 102.0 g of acrylic acid was diluted with 25.5 g of ion-exchanged water, and the solution was neutralized with 140 g of a 30% aqueous sodium hydroxide solution while cooling from outside. Next, thereto was added a solution of 0.204 g of potassium persulfate in 7.5 g of water to dissolve, and thereafter nitrogen gas was blown into the solution to remove oxygen dissolved in the aqueous solution. The contents of this flask were added dropwise to the above five-necked cylindrical rounded bottom flask over 1 hour to polymerize.

After the completion of polymerization, the reaction mixture was azeotropically dehydrated by the use of a dehydrating tube so as to adjust the water content of the resulting superabsorbent resin to 30 parts by weight per 100 parts by weight of the superabsorbent resin. Then a solution of 0.04 g of polyglycerol polyglycidyl ether (trade name: Denacol EX-512, manufactured by

Nagase ChemteX Corporation) in 4 g of water was added thereto as a crosslinking agent, followed by allowing the mixture to react at 75° to 80°C for 1 hour. After cooling, cyclohexane was removed by decantation, to give 125 g of a water-containing superabsorbent resin.

The amount 125 g of the resulting water-containing superabsorbent resin was put in a twin-cylinder kneader, and the entire amount of a mixture prepared by previously adding 1.9 g of the aqueous metal compound solution obtained above (equivalent to 0.03 parts by weight per 100 parts by weight of the superabsorbent resin) to 6.25 g of a 10% by weight aqueous sodium tripolyphosphate solution (equivalent to 0.5 parts by weight per 100 parts by weight of the superabsorbent resin) while mixing was sprayed thereto, and the components were sufficiently stirred and mixed. Further, the reaction mixture was dried under heating and reduced pressure conditions of 80° to 100°C and 50 Torr for 1 hour, and particles having sizes of 850 μm or larger were excluded with a sieve to obtain a superabsorbent resin.

The yellow index was measured according to the method described in the present specification for the superabsorbent resin of the follow-up experiment obtained in EP'063 (Experiment I).

II. Follow-up Experiment of Shimomura

The follow-up experiment of Shimomura was carried out in the following manner.

The follow-up experiments of Shimomura were carried out in the same manner as in Examples 1 and 5 of Shimomura as detailed below.

Experiment II-1 (Example 1 of Shimomura)

Specifically, in a 1000 ml five-necked cylindrical rounded bottom flask equipped with a stirrer was charged 50 g of an absorbent resin "AQUALIC CA," and 0.5 g of a 20% by weight aqueous sodium thiosulfate solution (equivalent to 1 part by weight based on 100 parts by weight of the absorbent resin) was sprayed thereto, and the components were stirred and mixed to give a granular absorbent of the follow-up experiment of Shimomura (Experiment II-1).

Experiment II-2 (Example 5 of Shimomura)

Specifically, first, in a polyethylene bag were charged 50 g of an absorbent resin "AQUALIC CA" and 0.25 g of a sodium sulfite powder (equivalent to 0.5 parts by weight based on 100 parts by weight of the absorbent resin), and the contents were sufficiently mixed.

Next, the entire amount of the above mixture was charged in a 1000 ml five-necked cylindrical rounded bottom flask equipped with a stirrer, and thereto was sprayed 0.25 g of a 35% aqueous hydrogen peroxide solution (equivalent to 0.5 parts by weight based on 100 parts by weight of the absorbent resin), and the contents were stirred and mixed, to give a granular absorbent of the follow-up experiment of Shimomura (Experiment II-2).

The yellow index was measured according to the method described in the present specification for the absorbent of the follow-up experiments obtained in Shimomura (Examples 1 and 5 of Shimomura; Experiments II-1 and II-2).

RESULTS AND DISCUSSION

Comparative Experiment

The results of the comparative experiment are shown in Table I. Also, the results of Example 3 described in the specification are also shown together.

Table I

	Reducing Agent	Metal Chelating Agent	Yellow Index	
			After Production	50°C, 90% RH After 20 Days
Example 3 of the Present Invention	Added After Polymerization (Gelated) 0.0625%	Added After Polymerization (Gelated) 0.0625%	7.4	8.2
Comparative Experiment	Added After Drying 0.0625%	Added After Polymerization 0.0625%	11.9	14.2

It can be seen from Table I that there is a difference in yellow index of the resulting water-absorbent resin due to the difference in the timing of the addition of the reducing agent. In addition, there is even a difference in yellow index of the water-absorbent resin at 50°C, 90% relative humidity (RH) after 20 days, the water-absorbent resin of the comparative experiment showing a yellow index of exceeding 12.

In other words, in the method of adding a reducing agent or an oxidizing agent to the water-absorbent resin obtained after drying, an equivalent level of an effect of preventing coloration to that in the method of adding a reducing agent or an oxidizing agent to a water-containing gelated product after the polymerization of the present invention cannot be obtained.

Therefore, one of ordinary skill in the art would not have arrived at the present invention by a mere combination of the disclosure of the use of a reducing agent and an oxidizing agent described in Shimomura with the disclosure of the water-absorbent resin composition described in EP'063.

Follow-up Experiments of Cited References (EP'063 and Shimomura)

The results of Experiment I and Experiments II-1 and II-2 are shown in Table II. Also, the results of Example 3 described in the specification are also shown together.

Table II

	Reducing Agent/ Oxidizing Agent	Metal Chelating Agent	Yellow Index	
			After Production	50°C, 90% RH After 20 Days
Ex. 3 of the Present Invention	Sodium Sulfite	Pentasodium Diethylene-triamine-pentaacetate	7.4	8.2
Exp. I	Not Added	Sodium Tripolyphosphate	12.0	21.2
Exp. II-1	Sodium Thiosulfate	Not Added	10.9	39.5
Exp. II-2	Sodium Sulfite and Hydrogen Peroxide	Not Added	11.5	64.1

It can be seen from Table II that the superabsorbent resin composition of EP'063 and the absorbent of Shimomura after having allowed to stand for 20 days at 50°C and 90% relative humidity have an yellow index exceeding 12.

In other words, in the superabsorbent resin composition of EP'063 and the absorbent of Shimomura, an equivalent level of an effect of preventing

coloration to that of the water-absorbent resin obtainable according to the present invention cannot be obtained.

In conclusion, it is evident from the above results that the present invention exhibits an advantageous effect of preventing coloration, and one of ordinary skill in the art would not have easily arrived at such an effect from the disclosures and teachings of EP'063 and Shimomura.

Statement Under 18 U.S.C. § 1001

The undersigned petitioner declares further that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

Masayoshi Handa

Masayoshi HANDA

January 16, 2008

Date